ITEM 102 FY95
04DS1
9 May 1994

PURCHASE DESCRIPTION

VHF SYNTHESIZED SIGNAL GENERATOR (0.01 to 140 MHz)

FSNFU-E

1.0 GENERAL DESCRIPTION This procurement requires a solid-state, signal generator covering the frequency range of 0.01 to 140 MHz; output level continuously adjustable from +19 to -117 dBm; CW operation, internal AM/FM and external AM/FM.

2.0 CLASSIFICATION The equipment shall meet the requirements of MIL-T-28800( ), Type III, Class 5, Style E, Color R for Navy shipboard, submarine, and shore applications with the following modifications and exceptions:

a. The Electromagnetic Interference requirements of MIL-T-28800( ) are limited to CE01, CE03 (150 kHz to 50 MHz narrowband and 600 kHz to 50 MHz wideband), CS01, CS02 (0.05 to 100 MHz), CS06, RE01 (relaxed 20 dB; back panel search excluded), RE02 (14 kHz to 10 GHz), and RS03.

b. The warm-up time is extended to two hours.

3.0 OPERATIONAL REQUIREMENTS The equipment shall be capable of generating signals within the parameters and accuracies specified herein.

3.1 Frequency Characteristics (where F = RF output frequency; L = output level)

3.1.1 Range: At least 10 kHz to 140 MHz

3.1.2 Resolution: 1 Hz

3.1.3 Accuracy: Within $\pm 1 pp 10^6$ after 1 hour operation

3.1.4 Stability: (After 2 hour warm up)

3.1.4.1 Internal Standard: < 5 pp 10^8/h (at 25°C ±5°C after warm up)
3.1.4.2 External Standard: Stability of external standard
3.1.4.2.1 Input Freq: Accepts either 5 or 10 MHz inputs
3.1.4.2.2 Level: > 0.5 vrms and < 2.0 vrms
3.1.4.3 Standard Output: 10 MHz into 50 Ω; level ≥ 0 dBm nominal; BNC female connector
3.1.4.4 Temperature: < 10 ppm (0 to 50°C)

3.1.5 Spectral Purity (Equal to or better than limits specified below)

3.1.5.1	Harmonics/Sub-Harmonics: <-30 dBc	[L < +7 dBm]
3.1.5.2	Non-harmonics/Spurious: < -70 dBc	[> ±15 kHz of F]
3.1.5.3	Power Line Spurious: < -40 dBc	[< ±15 kHz of F]

3.1.5.4 Phase Noise: (Measured in 1 Hz BW at 20 kHz offset from carrier)

3.1.5.4.1	At least -114 dBc/Hz	F < 75 MHz
	At least -120 dBc/Hz	F > 75 MHz

3.1.5.5	Residual FM: < 25 Hz rms	[50 Hz to 15 kHz bandwidth]
3.1.5.6	Residual AM: < 0.1% rms	[50 Hz to 15 kHz bandwidth]

3.2 Output Characteristics

3.2.1 Range: +19 to -117 dBm

3.2.2 Accuracy: at least

± 1.5 dB	(F > 400 kHz)
± 2.0 dB	(100 kHz < F < 400 kHz)
± 3.0 dB	(100 kHz < F)

3.2.3 Flatness: (Output variation measured at 0 dBm)

±1.0 dB (peak-peak variation ≤ 2 dB) (F > 400 kHz)

3.2.4 Display (digital): Output level selectable in units of either power (dBm) or volts into 50 Ω

3.2.4.1 Resolution: At least 0.1 dB

3.2.5 Output Impedance: 50 ohms nominal

3.2.6 Connector: BNC or Type-N female

3.2.6.1 VSWR < 1.5:1 for output levels ≤ -10 dBm
3.2.6.2 VSWR < 2.5:1 for output levels > -10 dBm

3.3 Modulation Characteristics

3.3.1 Source:
3.3.1.1 Frequency Range/Waveform: 10 Hz to 100 kHz / sinewave
3.3.1.2 Resolution: 3 digits
3.3.1.3 Level: At least 1 Vpeak
3.3.1.4 Impedance: 600 Ω or less
3.3.1.5 Output: Front/back panel BNC

3.3.2 Amplitude Modulation (AM) (where F = RF output frequency)

3.3.2.1 Internal AM
3.3.2.1.1 Rate (3 dB Bandwidth): 20 Hz to 50 kHz (AC coupled)
3.3.2.1.2 Depth: 0 to 99% (levels ≤ 0 dBm)
3.3.2.1.2.1 Display/Resolution: Digital 0-99% with 1% resolution
3.3.2.1.2.2 Accuracy: ±7% (Measured vs indicated depth at 1 kHz)
3.3.2.1.3 Distortion: < 5% (50% depth @ 1 kHz rate)
3.3.2.1.4 Incidental FM: < 400 Hz (50% depth @ 1 kHz rate)

3.3.2.2 External AM
3.3.2.2.1 Rate (3 dB Bandwidth): 20 Hz to 50 kHz (AC coupled)
3.3.2.2.2 Depth: 0 to 99% (levels ≤ 0 dBm)
3.3.2.2.3 Distortion: < 5% (50% depth @ 1 kHz rate)
3.3.2.2.4 Sensitivity: 1 V peak into 600 Ω produces depth selected within ±10%.

3.3.3 Frequency Modulation (FM)

3.3.3.1	Internal FM		(measured at 1 kHz rate)
3.3.3.1.1	Rate: At least 20 Hz to 100 kHz		
3.3.3.1.2	Deviation:	At least 0 to 100 kHz	(F < 30 MHz)
		At least 0 to 50 kHz	(30 < F < 64 MHz)
		At least 0 to 100 kHz	(64 < F < 128 MHz)
		At least 0 to 200 kHz	(F > 128 MHz)
3.3.3.1.3	Display/Resolution: Digital, at least 3 digits in kHz		
3.3.3.1.4	Accuracy: ±5% + 20 Hz		(Measured vs indicated deviation at 1 kHz)
3.3.3.1.5	Distortion: < 5%		(20 kHz dev @ 1 kHz rate)
3.3.3.1.6	Incidental AM: < 1%		(100 kHz dev @ 1 kHz rate)

3.3.3.2 External FM (same as 3.3.3.1 Internal FM except as noted below)
3.3.3.2.1 Rate: At least 10 Hz to 100 kHz
3.3.3.2.2 Sensitivity: 1 V peak into 600 Ω produces desired deviation within ±10%.
3.3.3.2.3 Input Impedance: 600 ohms ±10%

4.0 GENERAL REQUIREMENTS

4.1 Power: 115/230 Vac ±10% single phase, 50/60 Hz, 400 VA maximum

4.2 Lithium Batteries: Per MIL-T-28800, lithium batteries are prohibited without prior authorization. Requests for approving the use of lithium batteries, including those encapsulated in integrated circuits, shall be submitted to the procuring activity at the time of submission of proposals. Approval shall apply only to the specific model proposed.

4.3 Dimensions: The total volume shall not exceed 47,050 cm^3 (2893 in^3).

4.4 Weight: The overall weight of the unit shall be nominally less than 27.3 kg (60 lb).

4.5 Calibration Interval: The calibration interval shall be 12 months minimum. The equipment shall be within all accuracy requirements specified herein, with a 72% or greater confidence factor following a calibration interval of 12 months.

4.6 Remote Operation: The unit will be capable of remote operation via IEEE-488( ) bus interface. It shall operate as a talker or listener such that all functions except the power on/off switch are controllable and shall have as a minimum the following subset of GPIB commands: AH1, SH1, T6, L4, SR1, RL1, DC1.